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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,758	08/14/2002	Jeffrey Thomas Remillard	201-1006 FAM	9670

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EXAMINER	
JOHNSTON, PHILLIP A	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,758	REMILLARD ET AL.	
	Examiner	Art Unit	
	Phillip A Johnston	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 August 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

1. This Office Action is submitted in response to Amendment dated 5-25-2004, wherein Claims 1 and 4 are amended. Claims 1-20 are pending.

Claims Rejection – 35 U.S.C. 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-20, stand rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 6,028,722, to Lang, in view of Hosokawa, U.S. Patent No. 5,513,289.

Lang (722) discloses a Semiconductor laser array 66 in FIG. 21 comprises a plurality of laser device that are master oscillator power amplifiers (MOPA's) comprising stripe regions 67 which are pumped to function as a laser and diverging gain regions 68 which are biased to provide additional gain to the developed high power laser output to produce beams 62 of high power content. The output of beams 62 are divergent in both the lateral direction (FIG. 21) as well as in the transverse

direction (FIG. 22) so that lens system 60 provides orthogonal quasi-collimation. Lens system 60 comprises an array of input cylinder lens 63 extending in the transverse direction, one for each laser emitter, for collimating the radiation in the lateral direction and a single output cylinder lens 64 extending in the lateral direction for collimating the radiation in the transverse direction. By varying the focal length of the curvature of cylindrical lens 63, quasi-collimator 60 can collimate the beam to any selected height in the transverse direction. Output 69 is then provided as input to a reconfiguring system such as prism device 10 or 20 or to an optical handling system 50 as shown in FIG. 20. Other laser sources, beside MOPAs, e.g., unstable resonator or multimode laser sources, are also possible. See Column 14, line 13-42.

Lang (722) also discloses in FIGS. 23 and 24, another embodiment for the cylinder lens array 53 and beam filling optics 54 of FIG. 20. Semiconductor laser array 76 comprises a plurality of laser stripes 77 forming output beams 72 collimated by individual cylinder lenses 73 of lens system 70. The asymmetric output of the laser array requires some collimation in the fast axis or transverse direction, which is accomplished by cylinder lenses 73. The slow axis or lateral direction requires a precise alignment of adjacently aligned cylinder lenses. This arrangement can be accomplished by a discrete array of cylindrical lenses 73 which are comparatively inexpensive. Lens system 70 further comprises a lens support holder 78 having pairs of concave-shaped cradle regions 75 to receive the curved portion of a single cylinder lens 73 for proper alignment relative to the spacing of stripes 77 of laser array 76. The

cradle supports 75 provide for proper maintenance of the center-to-center spacing of lenses 73 relative to stripes 77 despite variations in their lens size, which is typical among such cylindrical lenses. Support holder may be made of silicon and machined or etched to provide lens cradle regions 75. As best seen in FIG. 23, cradle regions 75 are in pairs at opposite ends of slot 74 so that output 79 from cylinder lenses 73 proceeds through slot 74 to a beam reconfiguring system such as prism device 10 or 20 or to an optical handling system 50 as shown in FIG. 20.

Also FIG. 25 illustrates a converging lens system 80 for equalizing the aspect ratio of the output beam 52B from the beam reconfiguring device of this invention, such as from optical handling system 50. Lens system 80 comprises a slab optics element having converging sides 81 (wedge shaped) and an input end 82 of cylinder lens shape (curved in a direction perpendicular to the height) to collect the radiation and optically converge the light to an output 84 forming a substantially symmetrical spot for delivery to a symmetrical apertured device such as an input end of an optical fiber. See Column 14, line 43-67; and Column 15, line 1-10.

Lang (722) further discloses that the basic problem with coupling the optical output of a multiple emitter radiation source to an aperture limited waveguide device, such as an optical fiber, is that of coupling asymmetry: how to efficiently provide delivery of substantial optical power from a source comprising one or more semiconductor laser elements that provides a beam having a large aperture-times-divergence product aspect ratio to a small substantially orthogonally symmetrical spot

acceptable to the input aperture of an optical handling medium or device which receives delivery of the reconfigured optical beam. In the case of an optical device such as an optical fiber, the spot size of the focused beam must be equated to its input diameter and its acceptance angle (numerical aperture) in two orthogonal directions. Since the orthogonal divergence angles and aperture dimensions of the output beam from a semiconductor laser array are different in the lateral and transverse directions, it is difficult to simultaneously achieve a beam with the same spot size and divergence in orthogonal axes suitable for optically symmetrical applications requiring high optical power, such as focusing to meet the numerical aperture requirements of an optical fiber. See Column 1, line 17-38.

It should be noted, that owing to the necessity for meeting the numerical aperture requirements for coupling to any optical fiber, as stated above, it is implied herein that the dimensions of the Lang (722) apparatus are equivalent to the dimensions recited in Claims 9 and 16.

Lang (722) as applied above does not disclose the use of an input surface faceted in a direction along the height (h), as recited in Claims 1 and 4. However, Hosokawa (289) discloses in that in the optical circuit in accordance with the present invention, an optical waveguide is fixed on a substrate by use of an adhesive agent such that an optical element of the projection or depression shape (faceted) is integrally formed in the optical waveguide surface. Column 8, line 19-32.

Also FIGS. 9 to 15, diagrams for explaining application examples of optical devices which can be manufactured according to the optical device manufacturing

method, which include a grating (FIG. 9), a blazed grating (FIG. 10), a chirped grating (FIG. 11), a flat micro-lens (FIG. 12), a Fresnel lens array (FIG. 13), a micro-lens array (FIG. 14), and an optical disk (FIG. 15). Various application fields are considerable in which a Fresnel lens is produced with a material having a high refractive index and in which a transparent conductive substance (ITO) is employed as the material. See Column 11, line 33-46, and Figures 9-15 below.

Fig.9

Fig.10

Fig.11

Fig.12

Fig.13

Fig.14

Fig.15

Therefore it would have been obvious to one of ordinary skill in the art that the optical device and method of Lang (722) can be modified to use optical devices with shaped facets in accordance with Hosokawa (289), to produce a lens with a high numerical aperture and develops a high efficiency.

Examiners Response to Arguments

4. Applicant's arguments filed 5-25-2004 have been fully considered but they are not persuasive.

Argument 1.

Applicant states that, " Applicants submit that independent claims 1 and 4 are non-obvious in view of Lang and Hosokawa because neither reference, alone or in combination, discloses each and every element of Applicants' claimed invention. In particular, independent claims 1 and 4 require that the input surface of the coupling element directly receive emitted light from a plurality of diode lasers which the cited references fail to disclose or suggest."

Applicant also states that, "Applicants further submit that a prima facie case of obviousness has not been established against claims 6-20. There is no application of Lang or Hosokawa to independent claims 6, 13, or 18 in the Office Action. Nevertheless, Applicants' submit that these claims are non-obvlous because each claim requires a cylindrical lens positioned between the coupling element and the linear diode laser array which neilherlang or Hosokawa disclose or suggest.

The applicant is respectfully directed to Lang (722), Figures 21and 22 below; and Column 14, line 21-41, which states; Semiconductor laser array 66 in FIG. 21 comprises a plurality of laser device that are master oscillator power amplifiers (MOPA's) comprising stripe regions 67 which are pumped to function as a laser and diverging gain regions 68 which are biased to provide additional gain to the developed high power laser output to produce beams 62 of high power content. The output of beams 62 are divergent in both the lateral direction (FIG. 21) as well as in the transverse direction (FIG. 22) so that lens system 60 provides orthogonal quasi-collimation. Lens system 60 comprises an array of input cylinder lens 63 extending in the transverse direction, one for each laser emitter, for collimating the radiation in the lateral direction and a single output cylinder lens 64 extending in the lateral direction for collimating the radiation in the transverse direction. By varying the focal length of the curvature of cylindrical lens 63, quasi-collimator 60 can collimate the beam to any selected height in the transverse direction. Output 69 is then provided as input to a reconfiguring system such as prism device 10 or 20 or to an optical handling system 50 as shown in FIG. 20.

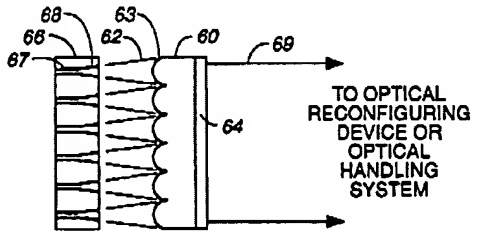

FIG._21

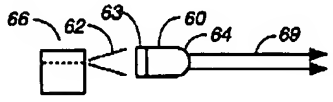

FIG._22

The applicant is also respectfully directed to Lang (722), Column 15, line 45-50, which states; Reference is now made to FIG. 25 which illustrates a converging lens system 80 for equalizing the aspect ratio of the output beam 52B from the beam reconfiguring device of this invention, such as from optical handling system 50. Lens system 80 comprises a slab optics element having converging sides 81 and an input end 82 of cylinder lens shape to collect the radiation and optically converge the light to an output 84 forming a substantially symmetrical spot for delivery to a symmetrical apertured device such as an input end of an optical fiber.

Also Figure 25 below;

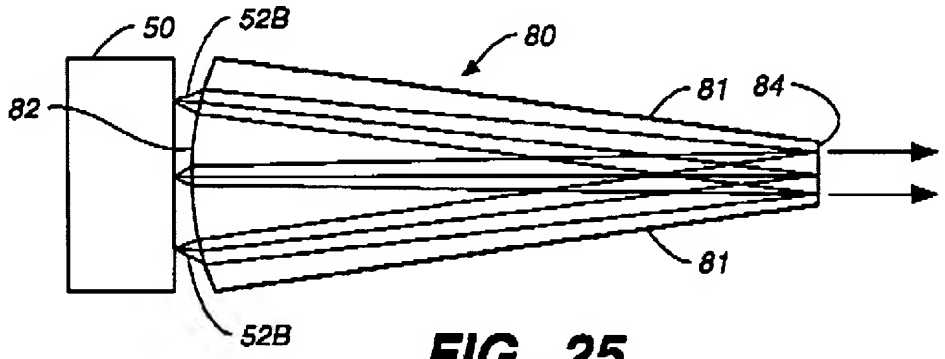

FIG._25

The examiner has interpreted from the Lang (722) references and Figures above that the curved input surface of the converging lens system 80 receives light directly from a plurality of diode lasers in an array via an optical handling system 50 (including a cylindrical lens), then collimates and directly couples the light to the output surface, and the input end of an optical fiber, as recited in claims 6,13, and 18.

The applicant is also respectfully directed to Hosokawa (289), Column 6, line 36-52, which states; Because the waveguide lens is unnecessary, the utilization efficiency of the light becomes higher (as an example, the efficiency values of the waveguide lens and the cylindrical Fresnel lens are about 10% and 70%, respectively.) Moreover, the processes for manufacturing the device are simplified. This expectably leads to a higher yielding of the devices and to a decrease in the production cost; furthermore, the size of the device may also be decreased. The composite optical device according to the present invention includes a transparent substrate, a grating layer disposed on an upper surface of the substrate, and a protective layer disposed on an upper surface of the grating layer, thereby forming a grating device, wherein over said grating device, one grating element or a plurality of grating elements are formed in an accumulated fashion along a vertical direction.

The examiner has interpreted from the Hosokawa (289) references above, that when coupling a laser array to a waveguide, a collimating lens is eliminated in favor of a grating (faceted) layer on the surface of the waveguide, as recited in claims 1 and 4.

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary

skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971) references are evaluated by what they suggest to one versed in the art, rather than by their specific: disclosures. In re Bozek, 163 USPQ 545 (CCPA 1969). In thus case, both Lang (722) and Hososkawa (289) disclose inventions that are directed to efficient optical coupling and/or collimation between a laser diode and a waveguide.

Conclusion

5. The Amendment filed on 5-25-2004 under 37 CFR 1.131 has been considered but is ineffective to overcome the Lang (722) and Hosokawa (289) references.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to

reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (571) 272-2477. The fax phone number for the organization where the application or proceeding is assigned is 703 872 9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ
July 30, 2004

JOHN R. LEE
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